

WHAT IS CLAIMED IS:

1. A recording apparatus for forming a color image on the recording material, comprising a recording head having a plurality of recording

5 elements;

recording head driving means for driving the recording elements of said recording head in accordance with image data to form an image on the recording material;

10 a plurality of supplementing means for effecting supplementations, in different manners, for supplementing defects in a recorded image resulting from a non-operating recording element of said recording elements; and

15 control means for selectively operating said plurality of supplementing means depending on a record image to effect the supplementation.

2. An apparatus according to Claim 1, wherein  
20 said supplementing means includes first supplementing means for effecting supplementation for a recording position which is to be recorded by the non-operating recording element with a color which is different from a color of said non-operating recording element.

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3. An apparatus according to Claim 1, wherein supplementing means includes second supplementing

means for effecting supplementation for the defect by  
correcting image data corresponding to a recording  
element adjacent to the non-operating recording  
element, on the basis of image data corresponding to  
5 the non-operating recording element.

4. An apparatus according to Claim 1, wherein  
said supplementing means includes first supplementing  
means for effecting supplementation for a recording  
10 position which is to be recorded by the non-operating  
recording element with a color which is different from  
a color of said non-operating recording element. ;  
and second supplementing means for effecting  
supplementation for the defect by correcting image  
15 data corresponding to a recording element adjacent to  
the non-operating recording element, on the basis of  
image data corresponding to the non-operating  
recording element.

20 5. An apparatus according to Claim 1, wherein  
said control means selects said supplementing means in  
accordance with a duty of the image to be recorded.

6. An apparatus according to Claim 1, wherein  
25 when the image to be recorded has a high duty, said  
control means selects said first supplementing means,  
and when the image to be recorded has a low duty, said

control means selects said second supplementing means.

7. An apparatus according to Claim 2, wherein  
said first supplementing means effects recording with  
5 different colors, and effects recording with the same  
colors as the non-operating recording elements but  
with similar lightnesses.

8. An apparatus according to Claim 7, wherein  
10 said first supplementing means includes correcting  
means for correcting image data corresponding to the  
non-operating recording elements in accordance with  
the color corresponding said to the recording element  
effecting the supplementation, said first  
15 supplementing means effects the supplementation on the  
basis of the image data corrected by said correcting  
means.

9. An apparatus according to Claim 3, wherein  
20 said second supplementing means corrects an image  
density indicated by the image data corresponding to  
the recording element which is adjacent to the non-  
operating recording element in accordance with the  
image density indicated by multi-value image data for  
25 the non-operating recording element.

10. An apparatus according to Claim 1, wherein

the non-operating recording element includes a recording element which has become incapable of recording operation.

- 5        11. An apparatus according to Claim 1, wherein  
said recording head includes a plurality of nozzles  
and wherein the ink is ejected from the nozzle by  
driving the recording element.

10      12. An apparatus according to Claim 11, wherein  
said recording element includes an electrothermal  
transducer for supplying thermal energy to the ink to  
generate a bubble in the ink.

15      13. A method for forming a color image on the  
recording material in accordance with image data,  
using a recording head having a plurality of recording  
elements, said method comprising the steps of:  
                a step of identifying non-operating recording  
20     element of the plurality of recording elements;  
                a step of discriminating an image recorded by  
said recording head;  
                a step of providing different supplementing  
manners for supplementing defects in a recorded image  
25     resulting from a non-operating recording element of  
said recording elements, selecting a supplement manner  
from the different supplementing manners, and

effecting control in accordance with the selected manner; and

a step of effecting recording with supplementation for the non-operating recording  
5 element through the selected manner.

14. A method according to Claim 13, wherein said supplementing step includes first supplementing step of effecting supplementation for a recording position  
10 which is to be recorded by the non-operating recording element with a color which is different from a color of said non-operating recording element.

15. A method according to Claim 13, wherein supplementing step includes second supplementing step of effecting supplementation for the defect by correcting image data corresponding to a recording element adjacent to the non-operating recording element, on the basis of image data corresponding to  
20 the non-operating recording element.

16. A method according to Claim 13, wherein said supplementing means includes first supplementing step of effecting supplementation for a recording position  
25 which is to be recorded by the non-operating recording element with a color which is different from a color of said non-operating recording element; and second

supplementing step of effecting supplementation for  
the defect by correcting image data corresponding to a  
recording element adjacent to the non-operating  
recording element, on the basis of image data  
5 corresponding to the non-operating recording element.

17. A method according to Claim 14, wherein said  
first supplementing step effects recording with  
different colors, and effects recording with the same  
10 colors as the non-operating recording elements but  
with similar lightnesses.

18. A method according to Claim 17, wherein said  
first supplementing step includes a correcting step of  
15 correcting image data corresponding to the non-  
operating recording elements in accordance with the  
color corresponding said to the recording element  
effecting the supplementation, said first  
supplementing step effects the supplementation on the  
20 basis of the image data corrected by said correcting  
means.

19. A method according to Claim 15, wherein said  
second supplementing step corrects an image density  
25 indicated by the image data corresponding to the  
recording element which is adjacent to the non-  
operating recording element in accordance with the

image density indicated by multi-value image data for the non-operating recording element.

20. A method according to Claim 16, wherein when  
5 the image to be recorded has a high duty, said  
selecting step selects said first supplementing step,  
and when the image to be recorded has a low duty, said  
selecting step selects said second supplementing step.

10 21. A method according to Claim 13, wherein the  
non-operating recording element includes a recording  
element which has become incapable of recording  
operation.

15 22. A memory medium storing a program for  
executing said recording method as defined in Claim  
13.

20 23. A recording apparatus for forming a color  
image on the recording material with different colors,  
comprising:  
a recording head having a plurality of recording  
elements;  
recording head driving means for driving the  
recording elements of said recording head in  
accordance with image data to form an image on the  
recording material; and

supplementing means for effecting  
supplementation recording with a different color of  
the non-operating recording element and with similar  
lightnesses, for a recording position which is to be  
5 recorded by the non-operating recording element.

24. An apparatus according to Claim 23, wherein  
said supplementing means includes correcting means for  
correcting image data corresponding to the non-  
10 operating recording elements in accordance with the  
color with which the supplementation is to be  
effected, said supplementing means effects the  
supplementation on the basis of the image data  
corrected by said correcting means.

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25. An apparatus according to Claim 23, wherein  
the non-operating recording element includes a  
recording element which has become incapable of  
recording operation.

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26. An apparatus according to Claim 23, wherein  
said recording head includes a plurality of nozzles  
and wherein the ink is ejected from the nozzle by  
driving the recording element.

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27. An apparatus according to Claim 26, wherein  
said recording element includes an electrothermal

transducer for supplying thermal energy to the ink to generate a bubble in the ink.

28. A recording method for forming a color image  
5 on the recording material with different colors, using  
a recording head having a plurality of recording  
elements, comprising the steps of:

- a step of identifying non-operating recording element of the plurality of recording elements;
- 10 a step of effecting recording in accordance with image data; and
- 15 a step of effecting supplementation recording with a different color of the non-operating recording element and with similar lightnesses, for a recording position which is to be recorded by the non-operating recording element.

29. A method according to Claim 28, wherein said supplementing step includes a correcting step for  
20 correcting image data corresponding to the non-operating recording elements in accordance with the color with which the supplementation is to be effected, said supplementing step effects the supplementation on the basis of the image data  
25 corrected by said correcting step.

30. A method according to Claim 28, wherein the

non-operating recording element includes a recording element which has become incapable of recording operation.

5        31. A method according to Claim 28, wherein said recording head includes a plurality of nozzles and wherein the ink is ejected from the nozzle by driving the recording element.

10        32. A method according to Claim 31, wherein said recording element includes an electrothermal transducer for supplying thermal energy to the ink to generate a bubble in the ink.

15        33. A memory medium storing a program for executing said recording method as defined in Claim 28.

20        34. A recording apparatus for forming a color image on the recording material with different colors, comprising:

a recording head having a plurality of recording elements;

25        recording head driving means for driving the recording elements of said recording head in accordance with image data to form an image on the recording material; and

supplementing means for effecting  
supplementation recording with a recording element for  
black color recording, for a recording position  
corresponding to a non-operating recording element  
5 among the recording elements for non-black color  
recording.

35. An apparatus according to Claim 34, wherein  
said supplementing means includes correcting means for  
10 correcting the image data corresponding to the non-  
operating recording element in accordance with a color  
indicated by the image data, and said supplementing  
means effecting the recording of the basis of the  
image data corrected by said correcting means.

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36. An apparatus according to Claim 34, wherein  
the non-operating recording element includes a  
recording element which has become incapable of  
recording operation.

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37. An apparatus according to Claim 34, wherein  
said recording head includes a plurality of nozzles  
and wherein the ink is ejected from the nozzle by  
driving the recording element.

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38. An apparatus according to Claim 37, wherein  
said recording element includes an electrothermal

transducer for supplying thermal energy to the ink to generate a bubble in the ink.

39. A recording method for forming a color image  
5 on the recording material with different colors, using  
a recording head having a plurality of recording  
elements, comprising the steps of:

a step of recording an image on the recording  
material by driving a plurality of recording elements  
10 of said recording head in accordance with image data;  
and

a step of effecting supplementation recording  
with a recording element for black color recording,  
for a recording position corresponding to a non-  
15 operating recording element among the recording  
elements for non-black color recording.

40. A method according to Claim 39, wherein said  
supplementing step includes a correcting step for  
20 correcting the image data corresponding to the non-  
operating recording element in accordance with a color  
indicated by the image data, and said supplementing  
means effecting the recording of the basis of the  
image data corrected by said correcting means.

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41. A method according to Claim 39, wherein the  
non-operating recording element includes a recording

element which has become incapable of recording operation.

42. A method according to Claim 39, wherein said  
5 recording head includes a plurality of nozzles and  
wherein the ink is ejected from the nozzle by driving  
the recording element.

43. A method according to Claim 42, wherein said  
10 recording element includes an electrothermal  
transducer for supplying thermal energy to the ink to  
generate a bubble in the ink.

44. A memory medium storing a program for  
15 executing said recording method as defined in Claim  
39.

45. A recording apparatus for forming a color  
image on the recording material, comprising  
20 a recording head having a plurality of recording  
elements;

inputting means for inputting multi-value  
image data indicative of an image density;

correcting means for correcting image data  
25 corresponding to a recording element which is adjacent  
to the non-operating recording element of said  
plurality of recording elements;

generating means for generating driving data for driving the recording elements corresponding thereto on the basis of the image data corrected by said correcting means; and

5 recording control means for controlling the recording elements of said recording head in accordance with the driving data thus generated to effect recording.

10 46. An apparatus according to Claim 45, wherein said correcting means corrects multi-value image data corresponding to the recording element located adjacent to the non-operating recording element.

15 47. An apparatus according to Claim 45, wherein the non-operating recording element includes a recording element which has become incapable of recording operation.

20 48. A method for forming a color image on the recording material in accordance with image data, using a recording head having a plurality of recording elements, said method comprising the steps of:

25 a step of inputting multi-value image data indicative of an image density;

a step of identifying a non-recording element of the plurality of the recording elements on the

basis of a variation in densities of a test pattern recorded by said recording head;

- a step of correcting, on the basis of the variation of the densities, image data corresponding to respective recording elements to raise an image density of the image data for the recording element which is adjacent to the non-operating recording element; and a step of correcting, on the basis of the variation of the densities, image data corresponding to respective recording elements to raise an image density of the image data for the recording element which is adjacent to the non-operating recording element; and

a step of generating driving data for driving the recording elements corresponding thereto on the basis of the image data corrected by said correcting means;

a step of recording controlling the recording elements of said recording head in accordance with the driving data thus generated to effect recording.

49. A method according to Claim 48, wherein said correcting means corrects multi-value image data corresponding to the recording element located adjacent to the non-operating recording element.

50. A method according to Claim 48, wherein the

non-operating recording element includes a recording element which has become incapable of recording operation.

5        51. A memory medium storing a program for executing said recording method as defined in Claim 48.

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